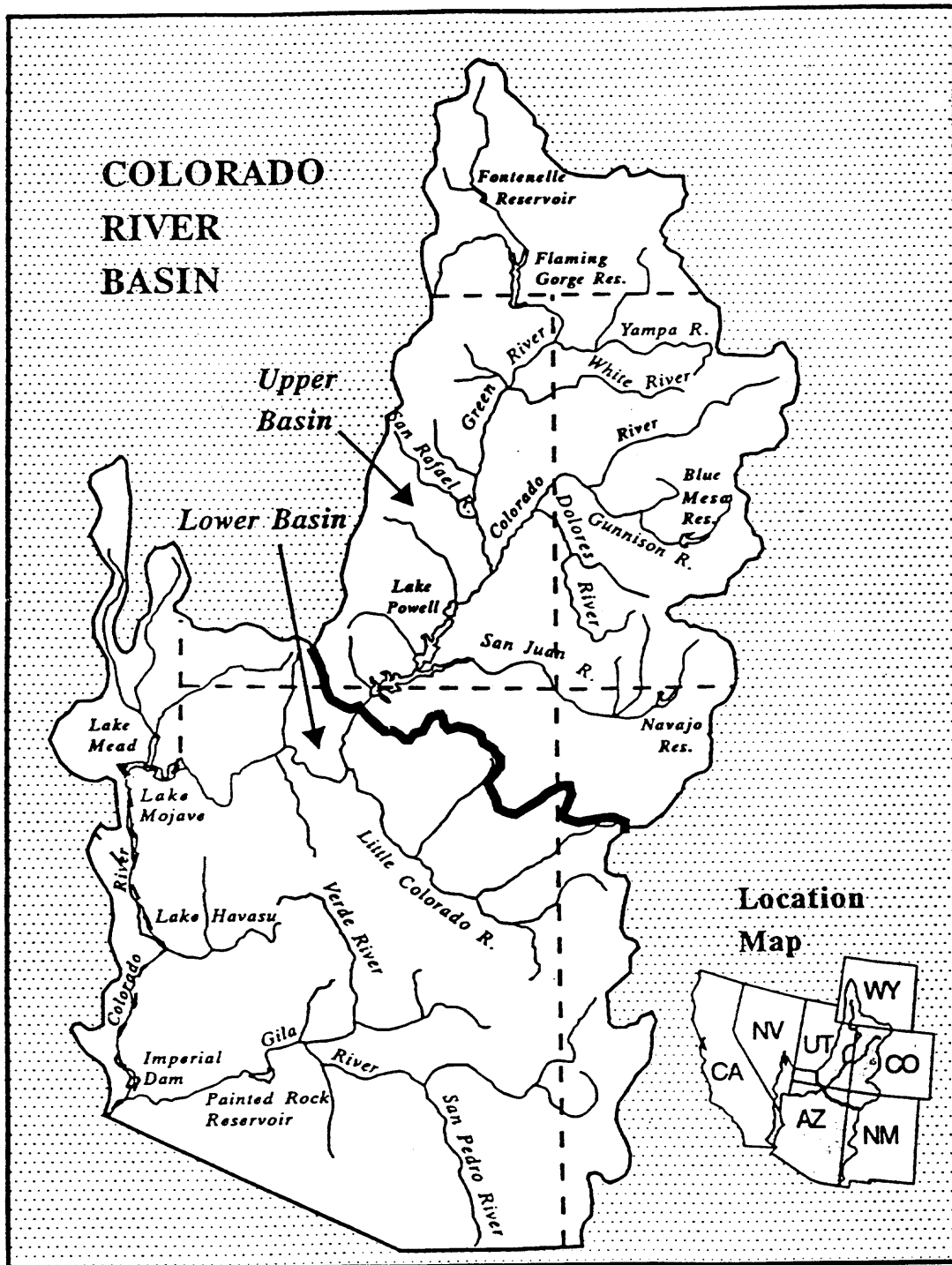


ANNUAL OPERATING PLAN FOR COLORADO RIVER RESERVOIRS

1998



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ANNUAL OPERATING PLAN FOR COLORADO RIVER RESERVOIRS

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INTRODUCTION

Authority

This 1998 annual operating plan (AOP) was developed in accordance with Section 602 of *The Colorado River Basin Project Act* (Public Law 90-537), and the *Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs Pursuant to the Colorado River Basin Project Act of September 30, 1968* (Operating Criteria), promulgated by the Secretary of the Interior pursuant thereto and other applicable statutes. In accordance with *The Colorado River Basin Project Act* and the Operating Criteria, the AOP must be developed and administered consistent with applicable Federal laws, *The Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande, Treaty Between the United States of America and Mexico*, signed February 3, 1944 (1944 Mexican Water Treaty), interstate compacts, court decrees, and other documents relating to the use of the waters of the Colorado River, which are commonly and collectively known as "The Law of the River."

The Operating Criteria and Section 602 of *The Colorado River Basin Project Act* mandates consultation with representatives of the Governors of the seven Basin States and such other parties as the secretary may deem appropriate in preparing the annual plan for operation of the Colorado River reservoirs. In addition, *The Grand Canyon Protection Act of 1992* (Title XVIII of Public Law 102-575) requires consultation to include the general public and others. Accordingly, the 1998 AOP was prepared by the Bureau of Reclamation (Reclamation) in consultation with the seven Basin States Governors' representatives; the Upper Colorado River Commission; appropriate Federal agencies; representatives of the academic and scientific communities, environmental organizations, and the recreation industry; contractors for the purchase of Federal power; others interested in Colorado River operations; and the general public; through the Colorado River Management Work Group.

Purpose

The purposes of the AOP are to determine: (1) the projected operation of the Colorado River reservoirs to satisfy project purposes under varying hydrologic and climatic conditions; (2) the quantity of water considered necessary as of September 30, 1998, to be in storage in the Upper Basin reservoirs as required by Section 602(a) of *The Colorado River Basin Project Act*; (3) water available for delivery pursuant to the 1944 Mexican Water Treaty and Minute No. 242 of the International Boundary and Water Commission, United States and Mexico (IBWC); (4)

whether the reasonable consumptive use requirements of mainstream users in the Lower Division States will be met under a "normal," "surplus," or "shortage" condition as outlined in Article III of the Operating Criteria; and (5) whether water apportioned to, but unused by one or more Lower Division States exists and can be used to satisfy beneficial consumptive use requests of mainstream users in other Lower Division States as provided in the 1964 U.S. Supreme Court decree in *Arizona v. California*.

Consistent with the above determinations and in accordance with other provisions of "The Law of the River," the AOP was developed with "appropriate consideration of the uses of the reservoirs for all purposes, including flood control, river regulation, beneficial consumptive uses, power production, water quality control, recreation, enhancement of fish and wildlife, and other environmental factors" (Operating Criteria, Article I(2)).

Since the hydrologic conditions of the Colorado River Basin can never be completely known in advance, the AOP addresses the operations resulting from three different hydrologic scenarios: the probable maximum, most probable, and probable minimum reservoir inflow conditions. River operations under the plan are modified during the year as runoff predictions are adjusted to reflect existing snowpack, basin storage, and flow conditions.

Summary

Upper Basin Delivery. Storage equalization and the avoidance of spills will control the annual releases from Glen Canyon Dam in accordance with Article II(3) of the Operating Criteria unless the minimum objective release criterion in Article II(2) is controlling. Downstream Lower Basin deliveries and/or flood control parameters are expected to control the releases from Hoover Dam.

Lower Basin Uses. Taking into account (1) the existing water storage conditions in the basin, (2) the most probable near-term water supply conditions in the basin, and (3) that the beneficial consumptive use requirements of Colorado River mainstream users in the Lower Division States are expected to be more than 9,250 MCM (7.5 MAF), the surplus condition is the criterion governing the operation of Lake Mead for calendar year 1998 in accordance with Article III(3)(b) of the Operating Criteria and Article II(B)(2) of the decree in *Arizona v. California*.

Any Lower Division State will be allowed to utilize water apportioned to, but unused by, another Lower Division State, in accordance with Article II(B)(6) of the decree in *Arizona v. California*.

1944 Mexican Water Treaty Delivery. A volume of 2,096 MCM (1.7 MAF) of water may be scheduled for delivery to Mexico during calendar year 1998 in accordance with Article 15 of the 1944 Mexican Water Treaty and Minute No. 242 of the International Boundary and Water Commission.

1997 OPERATIONS SUMMARY AND RESERVOIR STATUS

Water year 1997 observed above normal hydrologic conditions in the basin with above normal precipitation translating into above average snowpack. At the beginning of the runoff season the basin wide snowpack was about 146 percent of average.

Unregulated inflow into Lake Powell was 20,058 MCM (16.261 MAF) in water year 1997, approximately 139% of average. This inflow resulted in a gain of approximately 1,433 MCM (1.162 MAF) of storage in Lake Powell. Approximately 741 MCM (.600 MAF) of storage was gained in upstream reservoirs, approximately 2,706 MCM (2.193 MAF) was gained in Lower Basin reservoirs, and the total Colorado storage system gain approximately 4,880 MCM (3.955 MAF) during water year 1997. It is estimated that with average inflow during 1998, the system will remain relatively full. During 1997, all deliveries of water to meet obligations pursuant to "The Law of the River" were maintained.

Tables 1(a) and 1(b) list the expected October 1, 1997 reservoir vacant space, live storage, water elevation, percent of capacity, change in storage, and change in water elevation during water year 1997.

Table 1(a). Expected Reservoir Conditions on October 1, 1997 (Metric Units)

Reservoir	Vacant Space (MCM)	Live Storage (MCM)	Water Elevation (meters)	Percent of Capacity (percent)	Change in Storage* (MCM)	Change in Elevation* (meters)
Fontenelle	22	403	1982	95	+80	+2.58
Flaming Gorge	211	4,413	1840	95	+262	+1.62
Blue Mesa	131	892	2288	87	+46	+1.31
Navajo	255	1,837	1850	88	+353	+6.77
Lake Powell	2,473	27,528	1124	92	+1433	+2.39
Lake Mead	4,405	29,365	368	87	+2704	+4.64
Lake Mohave	236	1,997	195	89	51	+0.47
Lake Havasu	76	687	136	90	-49	-0.64
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Totals	7,810	67,122	--	90	4,880	--

Table 1(b). Expected Reservoir Conditions on October 1, 1997 (English Units)

Reservoir	Vacant Space (MAF)	Live Storage (MAF)	Water Elevation (feet)	Percent of Capacity (percent)	Change in Storage* (MAF)	Change in Elevation* (feet)
Fontenelle	.018	.327	6504	95	+0.065	+8.48
Flaming Gorge	.171	3.578	6036	95	+0.212	+5.33
Blue Mesa	.107	.723	7507	87	+0.037	+4.29
Navajo	.207	1.489	6071	88	+0.286	+22.20
Lake Powell	2.005	22.317	3687	92	+1.162	+7.85
Lake Mead	3.571	23.806	1206	87	+2.192	+15.22
Lake Mohave	.191	1.619	640	89	+0.041	+1.53
Lake Havasu	0.062	.557	447	90	-0.040	-2.09
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Totals	6.332	54.416	--	90	3.955	--

* from October 1, 1996 to September 30, 1997

1998 WATER SUPPLY ASSUMPTIONS

For 1998 operations, three reservoir unregulated inflow scenarios were developed and analyzed and are labeled as probable maximum, most probable, and probable minimum. The attached graphs show these inflow scenarios and associated release patterns, end of month contents, and end of month elevations for each reservoir.

The National Weather Service Extended Streamflow Prediction (ESP) computer model was employed to develop each of these inflow scenarios. This model uses current basin conditions as well as historical data to predict the range of possible future streamflows. Although there is considerable uncertainty associated with streamflow forecasts made a year in advance, the data are valuable in analyzing possible impacts on project uses and purposes. The most probable inflow in water year 1998 is projected to be near normal. Therefore, the magnitude of inflows in each of the three inflow scenarios are near the historical upper decile, mean, and lower decile (10 percent exceedance, 50 percent exceedance, and 90 percent exceedance, respectively) for each reservoir for water year 1998. The three inflow scenarios for Lake Powell are shown in Tables 2(a) and 2(b).

The volume of inflow resulting from these assumptions was used as input into Reclamation's monthly reservoir simulation model. This model is used to plan reservoir operations for the upcoming 24-month period. Projected water year 1998 inflow and October 1, 1997 reservoir storage conditions were used as input to this model and monthly releases were adjusted until release and storage levels accomplished project purposes.

Table 2(a). Projected Unregulated Inflow
Into Lake Powell for Water Year 1998
(Metric Units: MCM)

Time Period	Probable Maximum	Most Probable	Probable Minimum
10/97 - 12/97	2,752	1,855	1,185
1/98 - 3/98	2,758	1,729	968
4/98 - 7/98	15,218	9,541	5,343
8/98 - 9/98	2,141	1,342	751
10/98 - 12/98	1,850	1,850	1,848
WY 1998	22,869	14,468	8,248
CY 1998	21,967	14,463	8,911

Table 2(b). Projected Unregulated Inflow
Into Lake Powell for Water Year 1998
(English Units: MAF)

Time Period	Probable Maximum	Most Probable	Probable Minimum
10/97 - 12/97	2.231	1.504	0.961
1/98 - 3/98	2.236	1.402	0.785
4/98 - 7/98	12.337	7.735	4.332
8/98 - 9/98	1.736	1.088	0.609
10/98 - 12/98	1.500	1.500	1.498
WY 1998	18.540	11.729	6.687
CY 1998	17.809	11.725	7.224

1998 RESERVOIR OPERATIONS

Minimum instream flow levels and annual operating strategies have been established at several locations in the Upper Basin which are intended to protect the aquatic resources downstream of specific dams. The regulation of the Colorado River has had both positive and negative effects on aquatic resources. Controlled cool water releases from dams have provided for increased productivity of some aquatic resources and the development of significant introduced sport fisheries. However, the same releases may be detrimental to endangered and other native species of fishes.

Consultations with the Fish and Wildlife Service in compliance with Section 7 of the Endangered Species Act (Section 7 consultations) on the operation of the Aspinall Unit on the Gunnison River, Navajo Dam on the San Juan River, and Flaming Gorge on the Green River will continue in 1998. Studies associated with these consultations will be used to better understand the flow related needs of endangered and other native species of fish.

Modifications to planned operations may be made based on changes in forecast conditions. However, due to the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin, Section 7 consultations, and other downstream concerns, modification to the monthly operation plans may be based on other factors in addition to changes in streamflow forecasts. Decisions on spring peak releases and downstream habitat target flows may be made midway through the runoff season. Reclamation and the Fish and Wildlife Service will initiate meetings with interested parties, including representatives of the Basin States, to facilitate the decisions necessary to finalize site specific operations plans. All operations will be undertaken subject to the primary water storage and delivery requirements established by "The Law of the River" and other applicable statutes, including water quality control, recreation, enhancement of fish and wildlife, and other environmental factors.

Reclamation completed Section 7 consultation with the Fish and Wildlife Service in April, 1997 on current and projected discretionary routine lower Colorado River operations and maintenance activities for a period of up to 5 years. Reclamation and the Fish and Wildlife Service have also formed a partnership with other Federal, State and private agencies to develop the Lower Colorado River Multi-Species Conservation Program. This program permits both non-Federal and Federal parties to participate under Sections 7 and 10 of the Endangered Species Act.

The following paragraphs discuss the operation of each of the reservoirs with respect to compact, decree and statutory water delivery obligations, and instream flow needs for maintaining or improving aquatic resources, where appropriate.

Fontenelle Reservoir

Precipitation and ensuing runoff in the Upper Green River Basin during water year 1997 was the highest it has been since 1986. The April through July runoff into Fontenelle during water year 1997 was 1,592 MCM (1.291 MAF) or 152 percent of normal. Inflow peaked at 473 cubic

meters per second (16,700 cfs) on June 13. These high inflows prompted higher than expected releases during the month of June. Releases of 311 cubic meters per second (11,000 cfs) were made during much of June. However, there was no significant flooding in the city of Green River, Wyoming, located 60 river miles below the dam. The flood stage is exceeded when flows at Green River exceed 354 cubic meters per second (12,500 cfs).

Because the mean annual inflow of 1,480 MCM (1.229 MAF) far exceeds Fontenelle's storage capacity of 426 MCM (.345 MAF), significant power-plant bypasses are expected under the most probable and maximum probable inflow scenarios. Additionally, there is little chance that the reservoir will not fill during water year 1998. In order to minimize spring high releases, and to maximize downstream resources and power production, the reservoir will probably be drawn down to minimum pool elevation, 1970.0 meters (6463 feet) which corresponds to a volume of 115 MCM (0.093 MAF) of live storage.

Flaming Gorge Reservoir

Like Fontenelle Reservoir, inflows into Flaming Gorge were much above normal during water year 1997. April through July unregulated inflow was 2,044 MCM (1.657 MAF) or 139 percent of normal.

In May of 1997, an April through July inflow forecast of 2,220 MCM (1.800 MAF) was issued by the National Weather Service for Flaming Gorge. This high inflow forecast prompted a decision to use the bypass tubes to release water in excess of power plant capacity from Flaming Gorge. Bypass releases began on May 28, with 57 cubic meters per second (2000 cfs) being released through the two bypass tubes in addition to power plant capacity of 130 cubic meters per second (4600 cfs) for a total release of 187 cubic meters per second (6600 cfs). However, the day after the bypass releases began, heavy precipitation occurred in the Yampa River Basin. Following these heavy rains, unusually warm temperatures became manifest in the Yampa River headwaters as well. The combination of these two circumstances caused flows on the Yampa River to increase significantly. Because of concern over flooding on the Green River near Jensen, Ut. (below the confluence of the Yampa River), bypass releases were suspended on May 30. The Yampa River reached a peak flow of 575 cubic meters per second (20,300 cfs) on June 4, 1997. A day later flows on the Green River at Jensen reached 708 cubic meters per second (25,000 cfs). These flows were the highest peak flows recorded since 1984.

Bypass releases were reestablished on June 16. The Yampa River had dropped substantially by this time, but inflow forecasts to Flaming Gorge showed that the additional release of water was needed. The bypass release that began on June 16, however, differed from the earlier bypass operation in that the full capacity of the bypass tubes was utilized; the total release was 243 cubic meters per second (8,600 cfs). This bypass operation was scheduled to last from June 16 to June 23.

On June 21, however, in the late afternoon, a failure occurred in one of the bypass tubes. This caused flooding to occur within the power plant, which then triggered a complete shut-down of the power plant itself. For about six hours crews worked to contain the damage and return stable

flows to the Green River. By midnight of June 21, the river was flowing a stable 113 cubic meters per second (4000 cfs) with 56.6 cubic meters per second (2000 cfs) being released from the spillway and 56.6 cubic meters per second (2000 cfs) being released from the remaining operational bypass tube.

Significant work was performed in the latter part of June to put the power plant back on line. By June 29, damaged components in the Flaming Gorge generators had been repaired or replaced, and all three of the generating units were up and running. The damaged bypass tube will be repaired during water year 1998.

In 1997, Flaming Gorge was operated in accordance with the Biological Opinion on the Operation of Flaming Gorge (BOFG), issued in November 1992. The BOFG outlines the reservoir operations which may provide an improved habitat for endangered endemic species of fish. Late summer and early fall flows in 1997 differed from those recommended in the BOFG, however. The BOFG calls for releases to be made during this time period so as to achieve a target flow of 34 to 51 cubic meters per second (1200 to 1800 cfs) on the Green River near Jensen. In 1997, however, a target flow of 71 cubic meters per second (2500 cfs) was used. This change in operation was made in consultation with the Fish and Wildlife Service.

In water year 1998, Flaming Gorge will again be operated in accordance with the BOFG. A revised biological opinion on the operation of Flaming Gorge Dam is due out in December 1997. This revised opinion will likely describe specific constraints during the spring and winter seasons, but may also refine the constraints for the entire year.

Blue Mesa, Morrow Point, and Crystal Reservoirs (Aspinall Unit)

In water year 1997 the April through July unregulated runoff into Blue Mesa Reservoir was 1,310 MCM (1.062 MAF) or 152 percent of average. Water year 1997 unregulated inflow was 1,750 MCM (1.419 MAF) or 146 percent of average. Water year 1997 power plant bypasses were approximately 587 MCM (0.476 MAF) at Crystal. Releases and spills up to 153 cms (5,400 cfs) occurred at Crystal with flows in the river below the tunnel in excess of 133 cms (4,700 cfs). Blue Mesa filled easily during water year 1997.

Section 7 consultation with the Fish and Wildlife Service on the operation of the Aspinall Unit continued in 1997. As part of this consultation, a five-year effort to study the effect of various release patterns on habitat, reproductive success, and reintroduction of endangered fish in the Gunnison River is underway.

Additionally, the Aspinall Unit was operated as if the draft contract between Reclamation, the National Park Service, and the State of Colorado to deliver water from the Aspinall Unit to the Black Canyon of the Gunnison National Monument were in place. The operation was also coordinated with the Fish and Wildlife Service and others interested in the operation of the Aspinall Unit.

For water year 1998 operations, Blue Mesa Reservoir will be drawn down to at least an elevation of 2283 meters (7490 feet) by December 31, 1997, in order to minimize icing problems in the Gunnison River. Blue Mesa will continue to be drawn down through April 1998 to a level that will accommodate the current most probable inflow scenario and accomplish the release objectives with minimal power plant bypasses at Crystal.

The minimum release objective of the Aspinall Unit is to meet the delivery requirements of the Uncompahgre Valley Project and to keep a minimum of 8.5 cms (300 cfs) flowing through the Black Canyon of the Gunnison National Monument and to maintain a minimum of 8.5 cms (300 cfs) below the diversion structure at Redlands (at the confluence of the Gunnison and Colorado Rivers) during the summer months. Under all three inflow scenarios, Blue Mesa is expected to fill in the summer of 1998 and flows through the Black Canyon of the Gunnison National Monument are expected to be above the minimum release objective during the summer months. Filling of the reservoir in water year 1998 will ensure that reasonable specific releases required to study the protection and improvement of habitat for endangered fish can be accommodated. The forecasted runoff for the spring of 1998 will be closely monitored to achieve these objectives. To protect both the blue ribbon trout fishery in the Black Canyon and recreation potential, releases during 1998 will be planned to minimize large fluctuations in the daily and monthly flows in the Gunnison River below the Uncompahgre Tunnel Diversion.

Navajo Reservoir

The April through July unregulated inflow into Navajo Reservoir in water year 1997 was 1,026 MCM (0.832 MAF) or 123 percent of average. Water year 1997 unregulated inflow was 1,530 MCM (1.240 MAF) or 123 percent of average. Navajo Reservoir did not fill in 1997.

Section 7 consultation with the Fish and Wildlife Service on the operation of Navajo Dam continued in 1997. Water year 1997 was the seventh year of a seven-year study to evaluate alternative operations of Navajo Reservoir to benefit endangered fish. In an attempt to monitor the aquatic impact of low winter flows on the San Juan River, winter releases were restricted to 250 cfs during the November - February period. During the spring large releases of up to 140 cms (5,000 cfs) were made during June and July to coincide with the peak flows of the Animas River. This resulted in peak flows of 305 cms (10,800 cfs) at Bluff, Utah. After the completion of the large spring releases, releases were gradually reduced to approximately 17 cms (600 cfs) for the remainder of the year.

In water year 1998, Navajo Reservoir is expected to nearly fill only under the probable maximum inflow scenario. The reservoir should fill above 80 percent of full under the most probable and probable minimum scenarios. Releases from the reservoir will be held near 17 cms (600 cfs) through the fall and winter months and large releases will likely be made in May and June in order to improve the habitat and provide better spawning conditions for endangered fish in the San Juan River.

Lake Powell

The April through July unregulated inflow into Lake Powell in water year 1997 was 13,964 MCM (11.321 MAF) or 147 percent of average. Water year 1997 unregulated inflow was 20,057 MCM (16.261 MAF) or 139 percent of average. Lake Powell ended the water year 8 feet from full.

During March and April 1996, a test of the Beach/Habitat Building Flow was conducted from Glen Canyon Dam. The test consisted of peak releases of 45,000 cfs which lasted 7 days, preceded and followed by 4-day periods of low steady flows to allow photographic mapping and monitoring of the canyon resources. Scientific understanding and results of this test were presented in a symposium held April 8 - 10, 1997.

This test was implemented following discussions between the Department of the Interior, the Basin States, and key scientists and researchers which resulted in a long term agreement for managing spills from Glen Canyon Dam. This agreement provides for the use of reservoir releases in excess of power plant capacity required for dam safety purposes during high reservoir conditions to accomplish the objectives of the Beach/Habitat Building Flow described in the Record of Decision for the Glen Canyon Dam Final EIS (GCDFEIS). Such releases would be consistent with the 1956 Colorado River Storage Project Act, the 1968 Colorado River Basin Project Act and the 1992 Grand Canyon Protection Act. Such releases would be managed to the maximum extent possible to (1) protect river sediment storage downstream or (2) be released in such a way as to reshape river topography, redeposit sediment and enhance aquatic habitat. With current full reservoir system conditions, there is a possibility releases above powerplant capacity will be necessary in 1998. Such releases would be made consistent with the 1956 Colorado River Storage Project Act, the 1968 Colorado River Basin Project Act, and the 1992 Grand Canyon Protection Act. In accordance with the GCDFEIS and the Record of Decision, Reclamation intends to reinstall the spillway gate extensions at Glen Canyon Dam to increase the flexibility of managing high runoff years.

During water year 1998, releases greater than the minimum release objective of 10,152 MCM (8.230 MAF) likely will be made to avoid anticipated spills and/or to equalize the storage between Lakes Powell and Mead. Under the most probable inflow conditions, releases of 13,260 MCM (10.750 MAF) would be made, while under the probable maximum inflow scenario, approximately 21,759 MCM (17.640 MAF) will be released. This maximum probable inflow would require releases of about 708 cms (25,000 cfs) for a lengthy period of time.

The interim flow restrictions on the daily and hourly releases from Glen Canyon Dam implemented in August, 1991 were replaced during water year 1997 by the parameters of the Record of Decision for the GCDFEIS preferred alternative. Operating criteria and a plan of operations were issued on February 24, 1997, in accordance with the 1992 Grand Canyon Protection Act. A monitoring and research program has been implemented and will continue to measure the effect of operating criteria on downstream resources as part of the Adaptive Management Program. Releases from Lake Powell in water year 1998 will continue to reflect

consideration of the uses and purposes identified in the 1970 Operating Criteria and the 1992 Grand Canyon Protection Act, including ecological impacts to the Grand Canyon.

Table 3. Glen Canyon Dam interim flow restrictions

<u>Parameter</u>	(cms)	(cfs)	<u>conditions</u>
Maximum flow ⁽¹⁾	708.0	25,000	
Minimum flow	141.6	5,000	nighttime
	226.6	8,000	7:00 am to 7:00 pm
Ramp rates			
ascending	113.3	4,000	per hour
descending	42.5	1,500	per hour
Daily fluctuations ⁽²⁾	141.6 / 226.6	5,000 / 8,000	

Lake Mead

For calendar year 1997 the surplus condition was the criterion governing the operation of Lake Mead in accordance with Article III(3)(b) of the Operating Criteria and Article II(B)(2) of the decree in *Arizona v. California*. On February 28, 1997, Reclamation informed the International Boundary and Water Commission (IBWC) that there existed for calendar year 1997 surplus waters of the Colorado River within the provisions of Article 10(b) of the 1944 Mexican Water Treaty. On March 27, 1997, the IBWC sent Reclamation a revised delivery schedule for Mexico with total deliveries of 2,096 MCM (1.7 MAF).

Based on the January 8, 1997 inflow forecast, flood control releases from Hoover Dam were initiated on January 17, 1997 at the 19,000 cfs level, as required by the Flood Control Regulations developed by the Army Corp of Engineers and the Bureau of Reclamation. These releases were continued through February, 1997. The March, 1997 flood control releases were below the 19,000 cfs level. Releases of 713 MCM (.578 MAF) were released above downstream requirements in January, February, and March, 1997.

⁽¹⁾ to be evaluated and potentially increased as necessary and in years when delivery to the Lower Basin exceeds 10,152 MCM (8.23 MAF)

⁽²⁾ Daily fluctuations limit is 141.6 cms (5,000 cfs) for months with release volumes less than 740 MCM (.600 MAF); 169.9 cms (6,000 cfs) for monthly release volumes of 740 to 987 MCM (.600 to .800 MAF); and 226.6 cms (8,000 cfs) for monthly volumes over 990 MCM (.800 MAF)

During water year 1998, Lake Mead is expected to rise to elevation 368.7 meters (1209.48 feet) by the end of February, 1998, with 29,996 MCM (24.318 MAF) in storage, which is 94% of conservation capacity of 31,919 MCM (25.877 MAF). Lake Mead elevation will drop to 365.3 meters (1198.42 feet) by the end of June, 1998, with 27,986 MCM (22.688 MAF) in storage.

Flood control releases are projected under the most probable scenario in January 1998 at the 19,000 cfs level. There are flood control releases for February and March, 1998, but they are below downstream requirements. Hoover Dam is expected to release 13,691 MCM (11.1 MAF) during water year 1998. Downstream demands are expected to be about 13,198 MCM (10.7 MAF) for water year 1998.

No flood control releases are anticipated under the minimum probable scenario. Under the maximum probable, flood control releases are required January through July, 1998. January's required release is 30,000 cfs. February through May are at the 28,000 cfs level, June is above the 19,000 cfs level and July's required release is below downstream requirements. Space building is required from September through December, 1998.

Drawdown during the peak largemouth bass spawning period in April and May is planned to be near the limits of decline recommended in the July 1982 final report of a five-year study by the Arizona Game and Fish Department and the Nevada Department of Wildlife.

As Lake Mead remains near capacity and flood control releases are required by the Hoover Dam Flood Control Regulations, consideration will be given to making these releases over the fall and winter months to avoid high flow releases during the January through July runoff season. This distribution of water reduces the chance of bypassing hydroelectric powerplants below Hoover Dam and avoids the adverse impacts of higher flood control releases on fish and wildlife, recreation, water quality, and river stabilization.

Lakes Mohave and Havasu

Mohave and Havasu Reservoirs are scheduled to be drawn down in the late summer and winter months to provide storage space for local storm runoff and will be filled in the spring to meet higher summer water needs. This drawdown will also correspond with maintenance at both Davis and Parker Powerplants which is scheduled for September through February. The normal filling pattern of these two reservoirs coincides well with the fishery spawning period. Since lake elevations will be typical of previous years, normal conditions are expected for boating and other recreational uses.

Reclamation is the lead agency in the Native Fish Work Group, a multi-agency group of scientists attempting to augment the aging stock of the endangered razorback sucker in Lake Mohave. Larval suckers are captured by hand in and around spawning areas in late winter and early spring for rearing at Willow Beach Fish Hatchery below Hoover Dam. The following year, one year old suckers are placed into predator-free, lake-side backwaters for rearing through the spring and summer. When the lake is normally drawn down during the fall, these fish are

harvested from these rearing areas and then released to the lake. The suckers grow very quickly, usually exceeding ten inches in length by September.

Senator Wash and Laguna Reservoirs

Operations at Senator Wash Reservoir allow regulation of water deliveries to United States water users and Mexico downstream at Imperial Dam. The reservoir is operated to meet water user demands when necessary and to prevent Colorado River flows from exceeding Mexican Treaty requirements at Morelos Dam. This includes excess flows in the river caused by water user cutbacks and sidewash inflows. Operational objectives at and below Imperial Dam are to meet water user demands, to conserve water, to control sediment, and to maintain the river channel.

Releases from Imperial Dam are regulated by Laguna Reservoir to conserve water, to meet all or part of Mexico's water demands, and to maintain river flows downstream near Yuma. Laguna releases combined with agricultural seepage and drainage provide a continuous live stream serving recreational and fish and wildlife purposes. Larger releases from Laguna Dam are generally due to excess water from rain, flooding upstream, or from rejected water orders due to rain. These higher releases serve to maintain the river channel capacity. This occasional practice reduces channel maintenance expense without impairment of water conservation or power production.

Yuma Desalting Plant

The Yuma Desalting Plant was not operated in 1997, and will not be operated in 1998 as funding is currently not available for full-scale operation. Most of the damage to the Main Outlet Drain (MOD), the Main Outlet Drain Extension (MODE), and the bypass drain from the 1993 Gila River flood has been repaired. Some damage to the MODE near the Gila River confluence will be repaired at a later date. All Wellton-Mohawk Irrigation and Drainage District drainage flows should be diverted into the MODE in 1998.

The test train, used for research and the building's water service, will be run throughout 1998. The test train uses about one million gallons per day of drainage water taken from the MODE or pumped from an on-site well.

Colorado River Channel Aggradation below Gila River Confluence

The 1993 Gila River flood deposited large amounts of sediment in the lower Colorado River above and below Morelos Dam. This has substantially reduced the river's capacity to carry flood flows, raised groundwater levels, and has caused operational problems with the delivery of Treaty water to Mexico above Morelos Dam.

The Yuma Area Office has been working with local irrigation districts, the International Boundary and Water Commission, Native American Tribes, local environmental organizations, local governments, and other State and Federal agencies to develop a project proposal to solve the problems created by the channel aggradation.

The overall project is being phased with initial work to begin in the fall of calendar year 1997.

1998 DETERMINATIONS

The AOP provides guidance regarding reservoir storage and release conditions during the upcoming year, based upon Congressionally mandated storage, release, and delivery criteria and determinations. After meeting these requirements, specific reservoir releases may be modified within these requirements as forecast inflows change in response to climatic variability and to provide additional benefits coincident to the projects' multiple purposes.

Upper Basin Reservoirs

The Operating Criteria provide that the annual plan of operation shall include a determination of the quantity of water considered necessary to be in Upper Basin storage at the end of the water year. Taking into consideration all relevant factors required by the Operating Criteria, it has been determined that the active storage in Upper Basin reservoirs forecast for September 30, 1998 exceeds the storage required under Section 602(a) of the *Colorado River Basin Project Act* under any reasonable range of assumptions which might be applied. Therefore, "602(a) Storage" is not the criterion controlling the release of water from Glen Canyon Dam during water year 1998.

Section 602(a)(3) of the *Colorado River Basin Project Act* provides for the storage of Colorado River water in Upper Basin reservoirs that the Secretary of the Interior finds necessary to assure deliveries to comply with Articles III(c) and III(d) of the 1922 *Colorado River Compact*, without impairment to the annual consumptive use in the Upper Basin. The Secretary is required to make this determination after consultation with the Upper Colorado River Commission and representatives from the three Lower Division States, and after taking into consideration all relevant factors including, historic stream flows, the most critical period of record, the probabilities of water supply, and estimated future depletions. Water not required to be so stored will be released from Lake Powell:

- to the extent it can be reasonably applied in the States of the Lower Division to the uses specified in Article III(e) of the 1922 *Colorado River Compact*, but these releases will not be made when the active storage in Lake Powell is less than the active storage in Lake Mead,
- to maintain, as nearly as practicable, active storage in Lake Mead equal to the active storage in Lake Powell, and
- to avoid anticipated spills from Lake Powell.

Spill avoidance and/or storage equalization criterion in accordance with Article II(3) of the Operating Criteria will control the releases from Glen Canyon Dam during water year 1998 unless the minimum objective release criterion in Article II(2) is controlling. Under the most probable inflow scenario Glen Canyon Dam will release 13,260 MCM (10.750 MAF).

Lower Basin Reservoirs

Water shall be released or pumped from Lake Mead to meet the following requirements:

- (a) 1944 Mexican Water Treaty obligations;
- (b) Reasonable beneficial consumptive use requirements of mainstream users in the Lower Division States;
- (c) Net river losses;
- (d) Net reservoir losses;
- (e) Regulatory wastes.

The Operating Criteria provide that after the commencement of delivery of mainstream water by means of the CAP, the Secretary of the Interior will determine the extent to which the reasonable beneficial consumptive use requirements of mainstream users are met in the Lower Division States. The reasonable beneficial consumptive use requirements are met depending on whether a normal, surplus, or shortage condition has been determined. The normal condition is defined as annual pumping and release from Lake Mead sufficient to satisfy 9,251 MCM (7.500 MAF) of consumptive use in accordance with Article III(3)(a) of the Operating Criteria and Article II(B)(1) of the U.S. Supreme Court decree in *Arizona v. California*. The surplus condition is defined as annual pumping and release from Lake Mead sufficient to satisfy in excess of 9,251 MCM (7.500 MAF) of consumptive use in accordance with Article III(3)(b) of the Operating Criteria and Article II(B)(2) of the U.S. Supreme Court decree in *Arizona v. California*.

The current water supply conditions forecast mandatory flood control releases that are projected to be above downstream requirements in January through March of 1998. Using a most probable inflow forecast for 1998, flood control releases are also projected in January, February, and March of 1999. Therefore, taking into account (1) the existing water storage conditions in the basin, (2) the most probable near-term water supply conditions in the basin, and (3) that the beneficial consumptive use requirements of Colorado River mainstream users in the Lower Division States are expected to be more than 9,250 MCM (7.5 MAF), the surplus condition is the criterion governing the operation of Lake Mead for calendar year 1998 in accordance with Article III(3)(b) of the Operating Criteria and Article II(B)(2) of the decree in *Arizona v. California*. While there still is no agreed upon long term strategy for the determination of surplus conditions, the making of this determination, based on flood control and spill avoidance considerations, does not preclude the Secretary from adopting other determination criteria in future years.

Nothing in the decree in *Arizona v. California* prohibits the Secretary of the Interior from releasing water apportioned, but unused, in any Lower Division State for that year for consumptive use in any other Lower Division State. No rights to the recurrent use of such water accrue by reason of the use of such water. In light of this provision and in accordance with Article II(B)(6) of the decree, any Lower Division State will be allowed to utilize water apportioned to, but unused by, another Lower Division State in calendar year 1998.

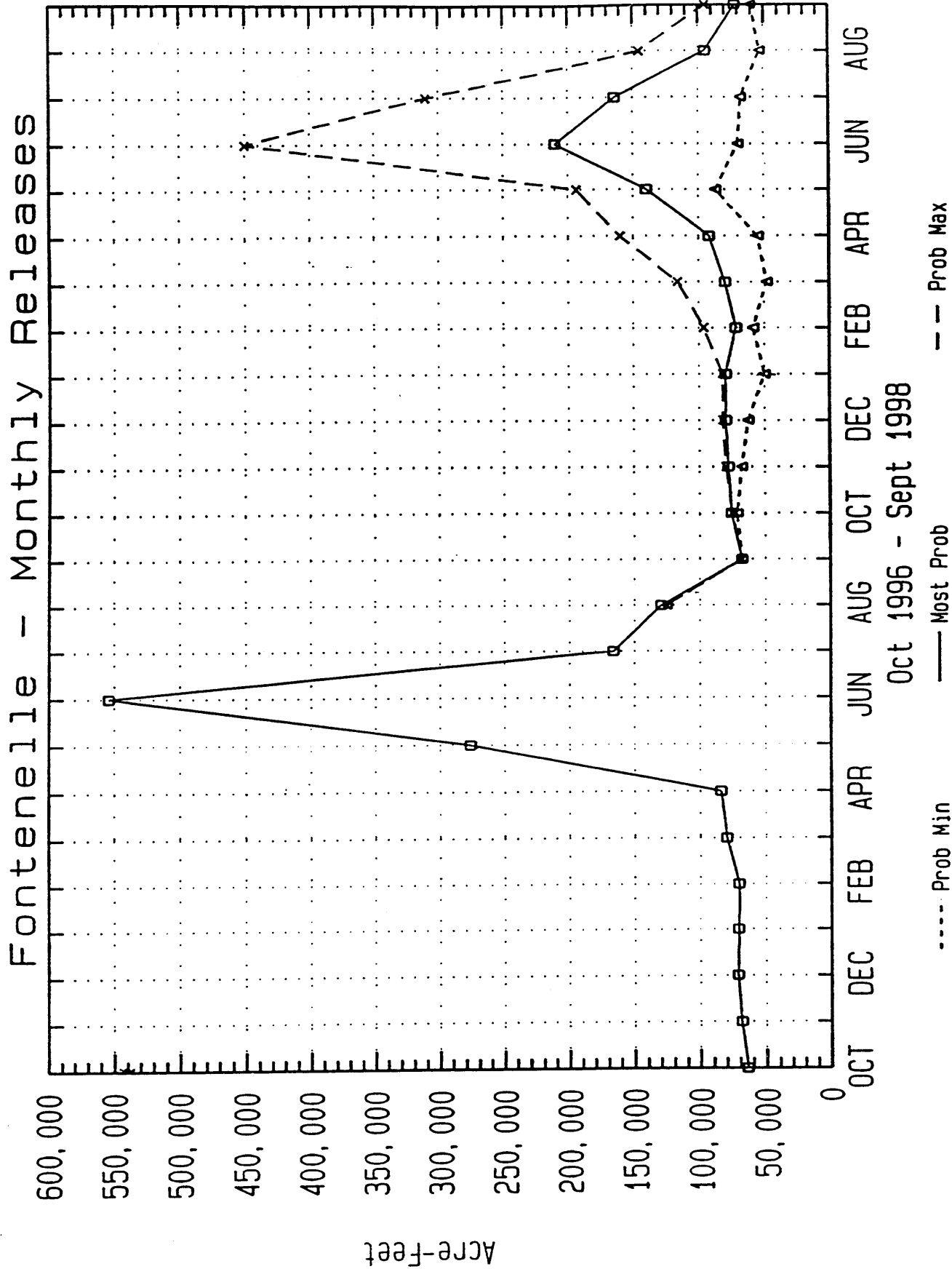
1944 Mexican Water Treaty

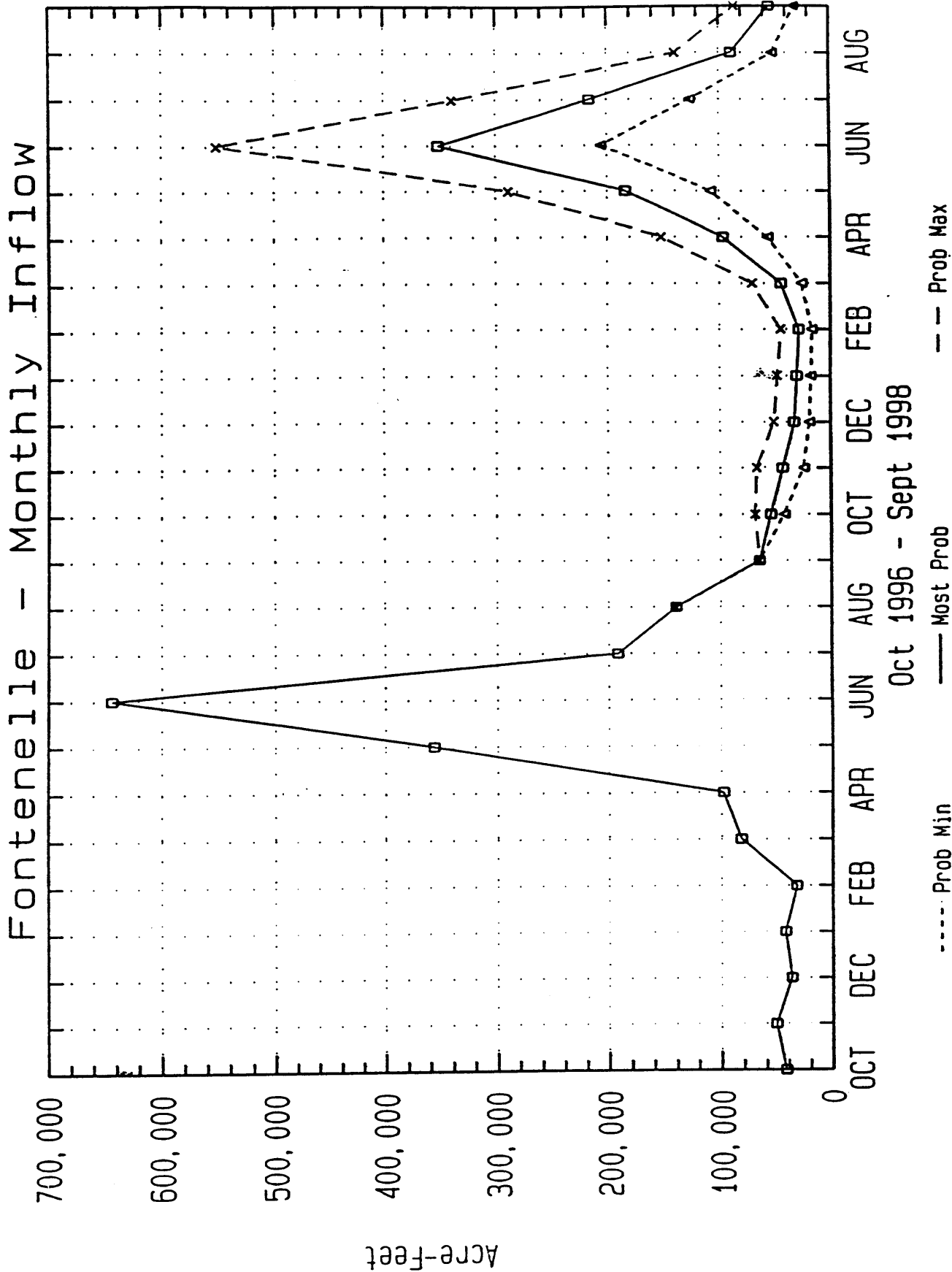
Pursuant to the 1944 Mexican Water Treaty it has been determined that under most probable inflow conditions, water in excess of that required to supply uses in the United States will be available. Therefore, a volume of 2,096 MCM (1.7 MAF) of water may be scheduled for delivery to Mexico during calendar year 1998 in accordance with Article 15 of the 1944 Mexican Water Treaty and Minute No. 242 of the International Boundary and Water Commission. Calendar year schedules of monthly deliveries of Colorado River water are formulated by the Mexican Section of the IBWC and presented to the United States Section before the beginning of each calendar year.

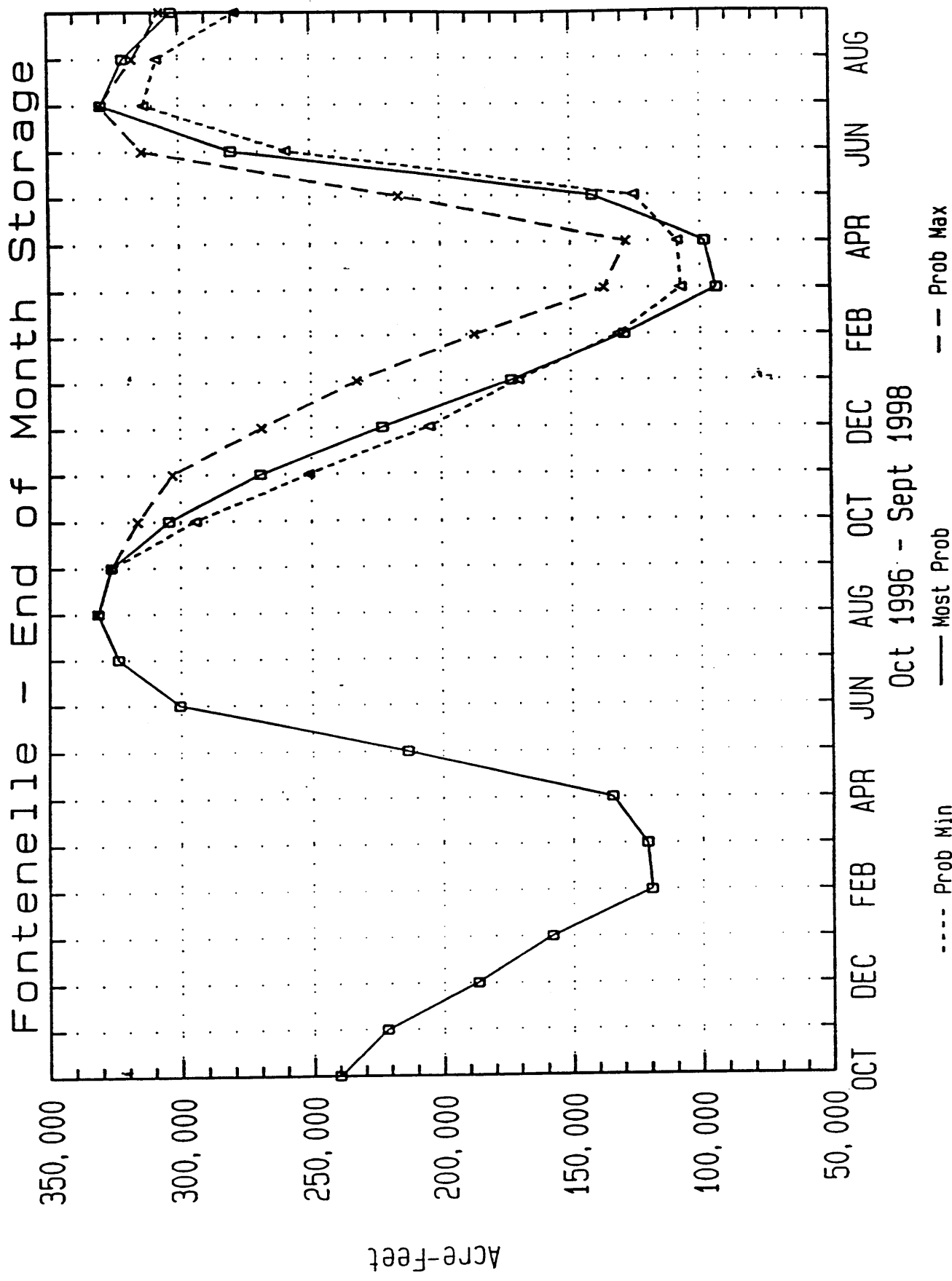
DISCLAIMER

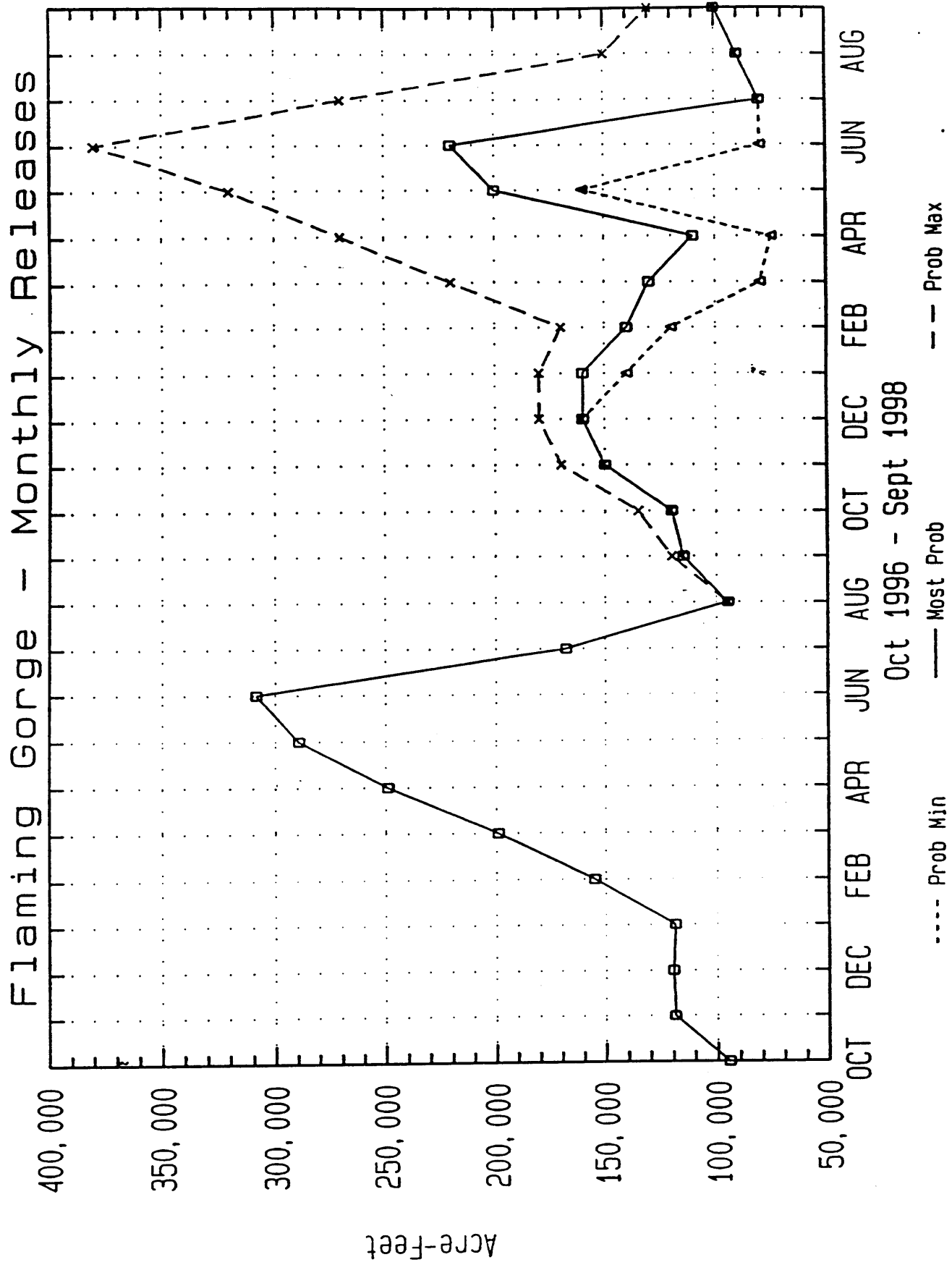
Nothing in this Annual Operating Plan is intended to interpret the provisions of *The Colorado River Compact* (45 Stat. 1057), *The Upper Colorado River Basin Compact* (63 Stat. 31), *The Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande, Treaty Between the United States of America and Mexico* (Treaty Series 994, 59 Stat. 1219), the United States/Mexico agreement in Minute No. 242 of August 30, 1973, (Treaty Series 7708; 24 UST 1968), the Decree entered by the Supreme Court of the United States in *Arizona v. California et al.* (376 U.S. 340), *The Boulder Canyon Project Act* (45 Stat. 1057), *The Boulder Canyon Project Adjustment Act* (54 Stat. 774; 43 U.S.C. 618a), *The Colorado River Storage Project Act* (70 Stat. 105; 43 U.S.C. 620), *The Colorado River Basin Project Act* (82 Stat. 885; 43 U.S.C. 1501), *The Colorado River Basin Salinity Control Act* (88 Stat. 266; 43 U.S.C. 1951), *The Hoover Power Plant Act of 1984* (98 Stat. 1333), *The Colorado River Floodway Protection Act* (100 Stat. 1129; 43 U.S.C. 1600), or *The Reclamation Projects Authorization and Adjustment Act of 1992* (106 Stat. 4669).

Attachment. Monthly inflow, monthly release, end of month contents, and end of month elevations for Colorado River reservoirs (October 1996 through September 1998) under the probable maximum, most probable, and the probable minimum inflow scenarios.

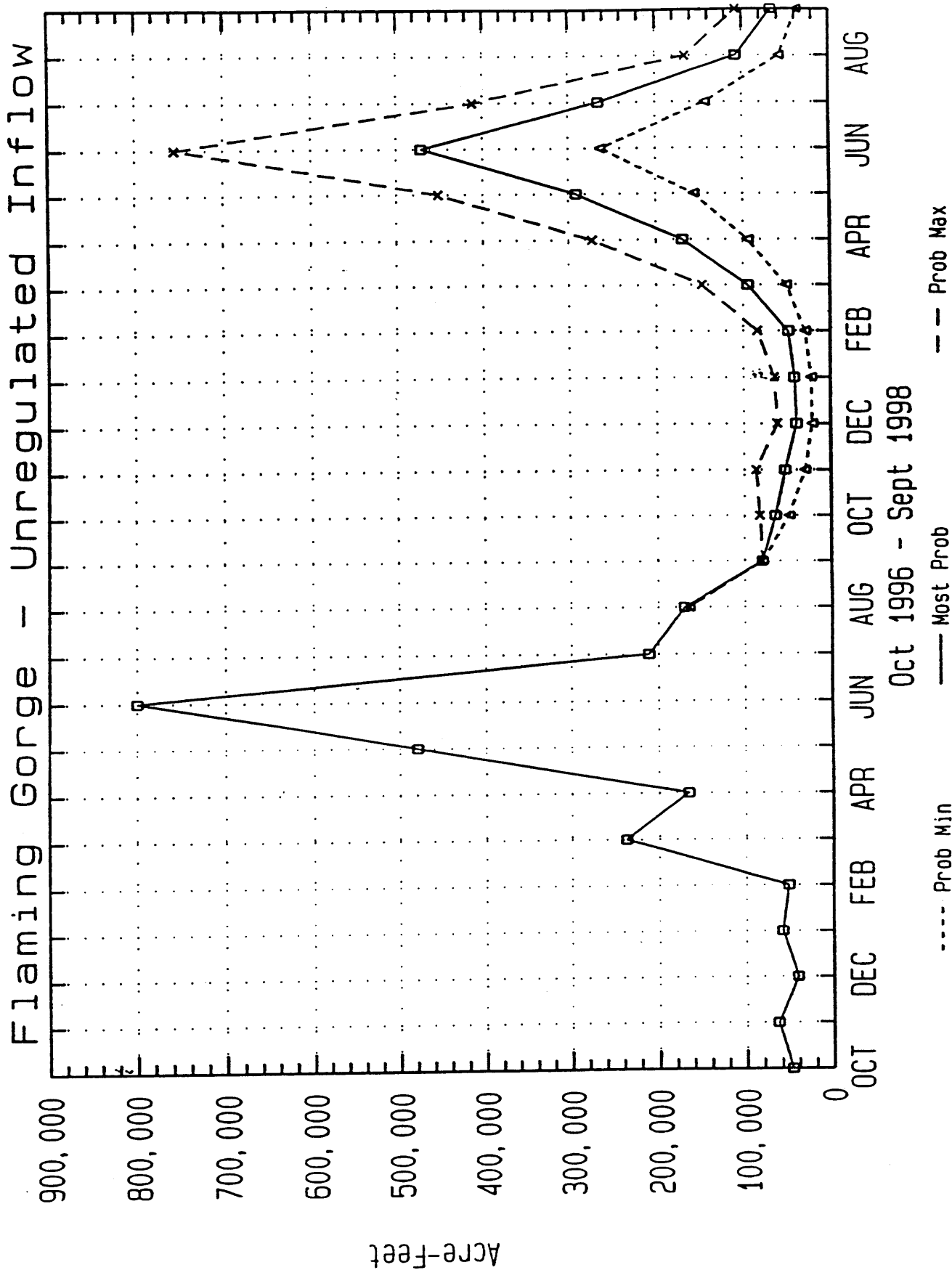


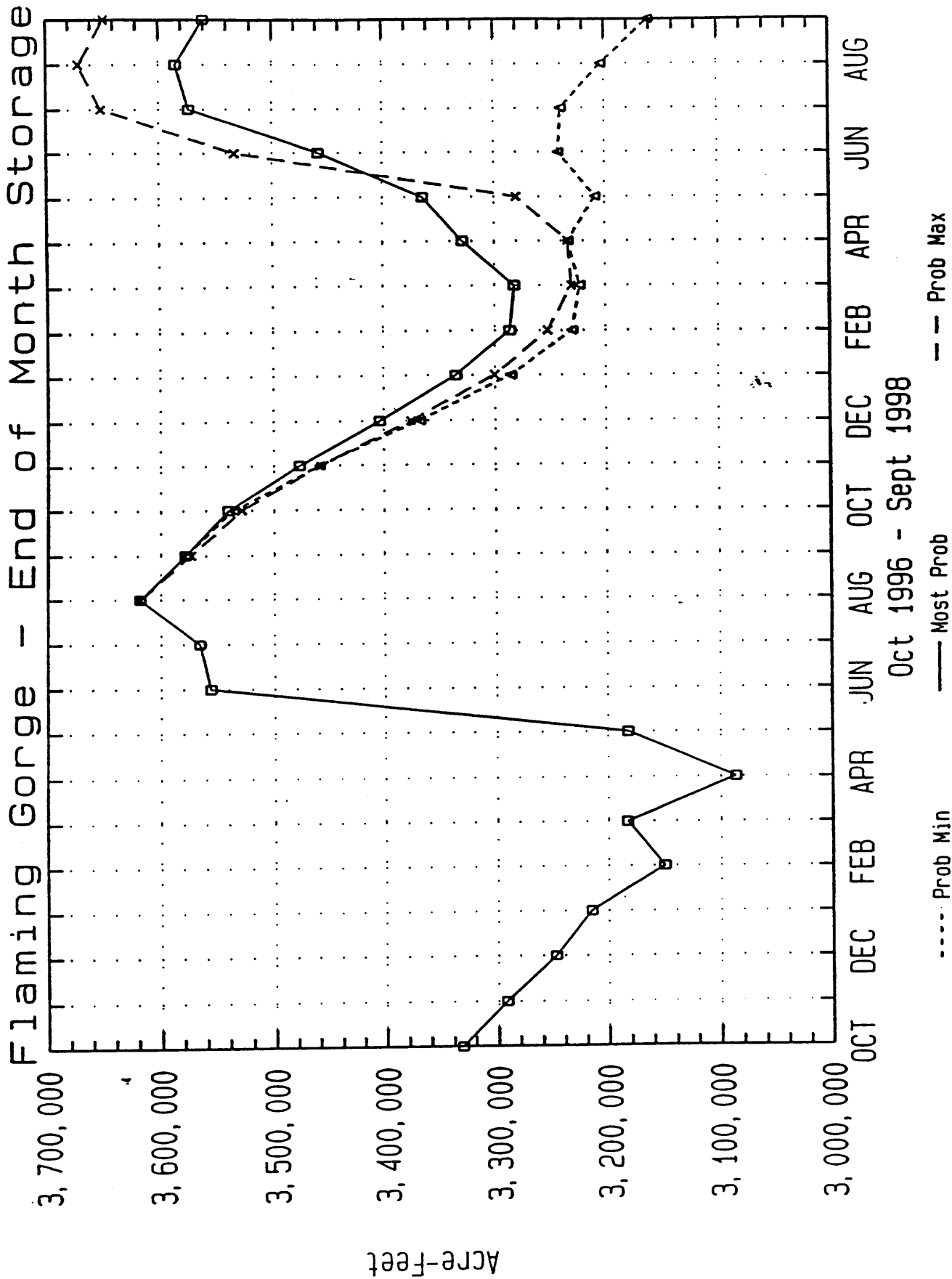




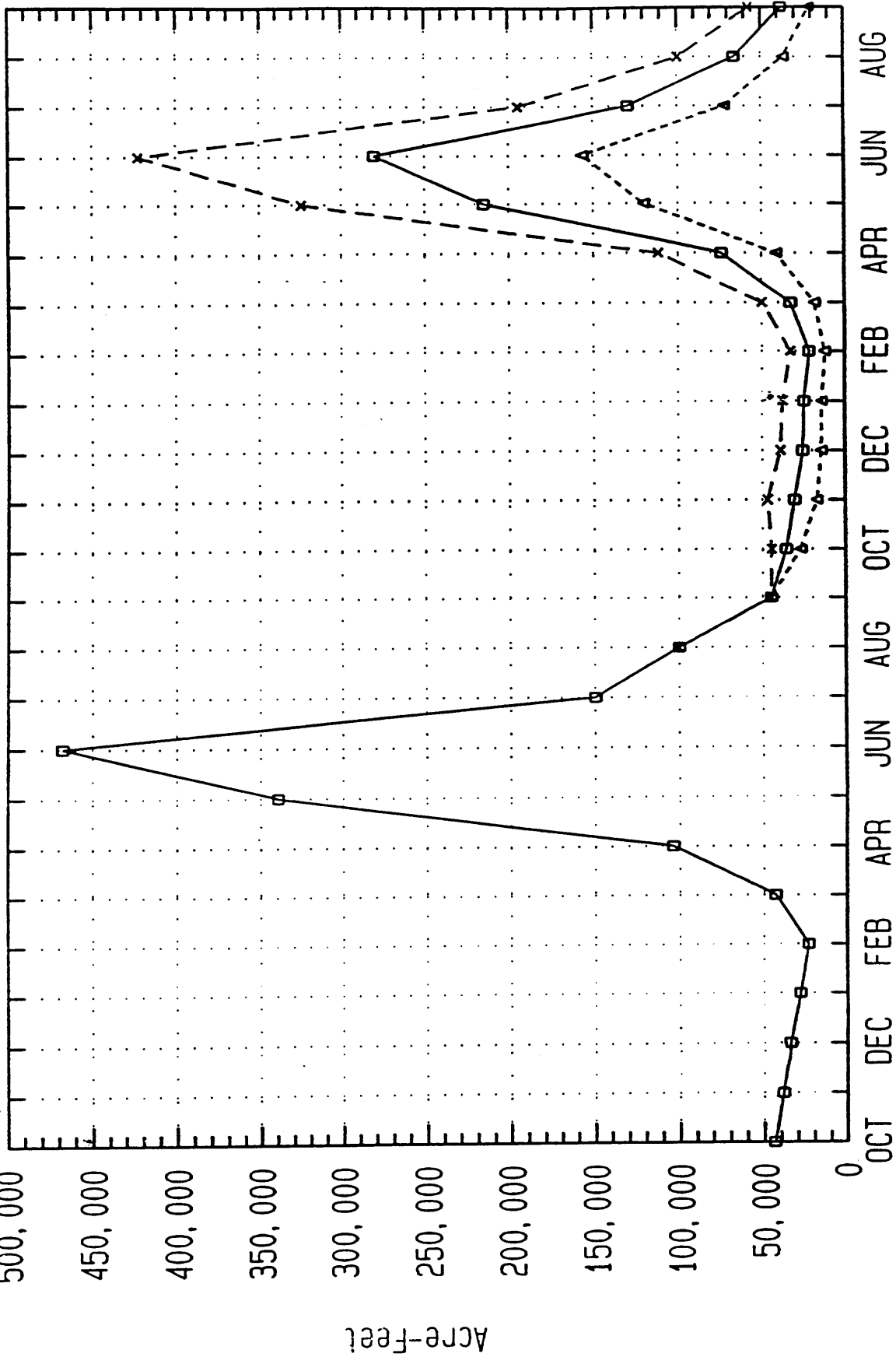


Flaming Gorge - Unregulated Inflow



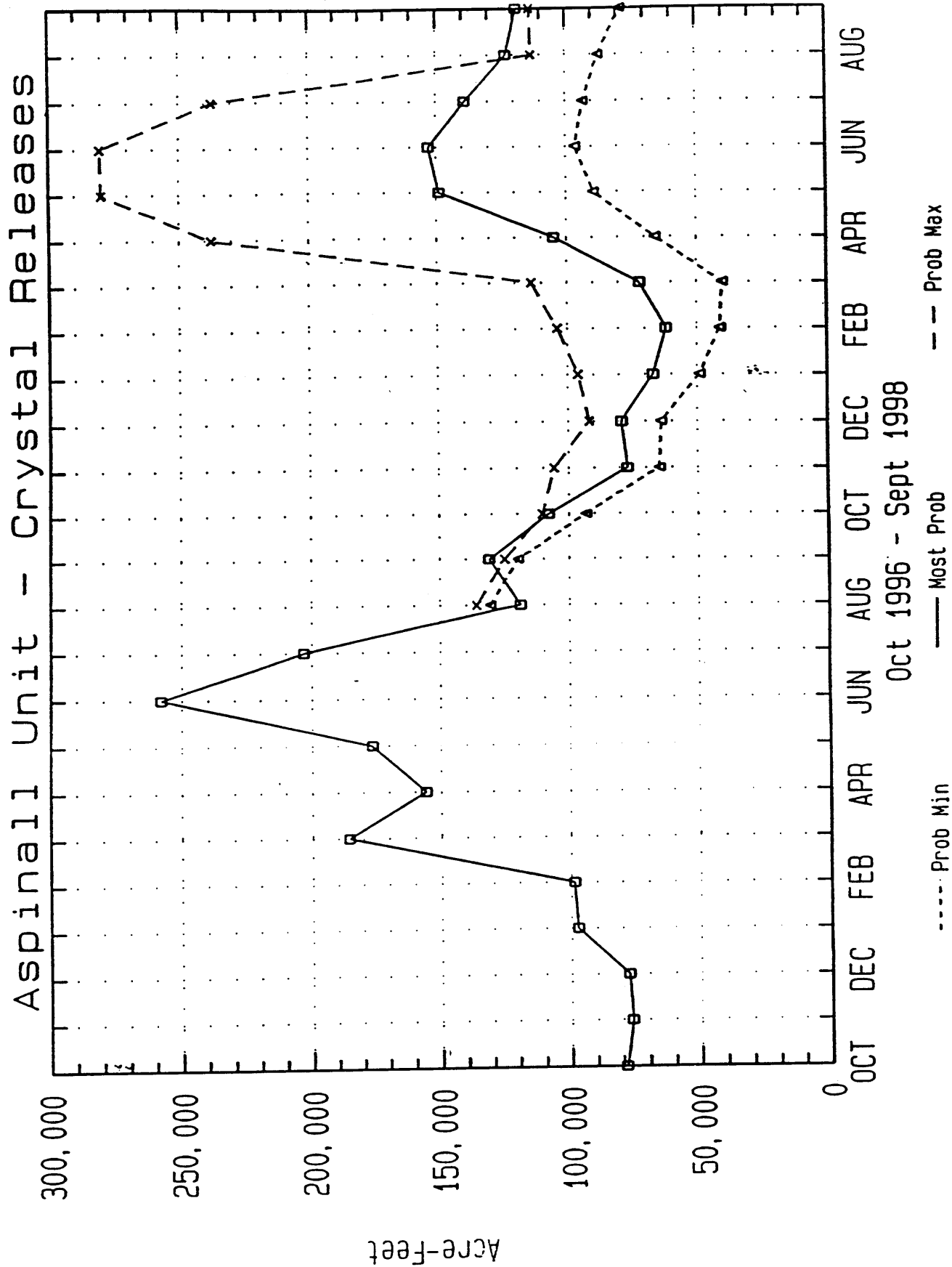


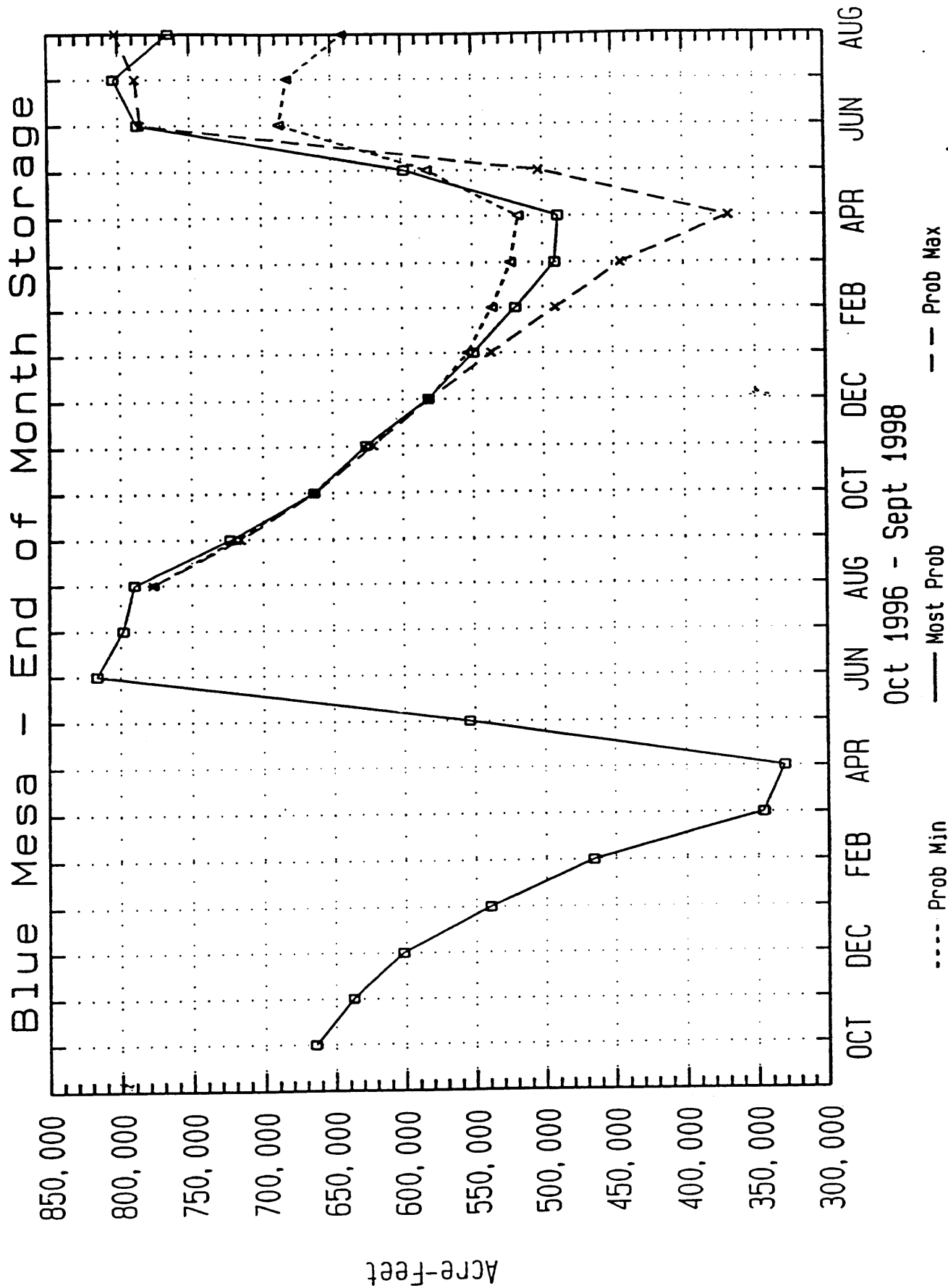
Aspinall Unit - Blue Mesa Unreg Inflow

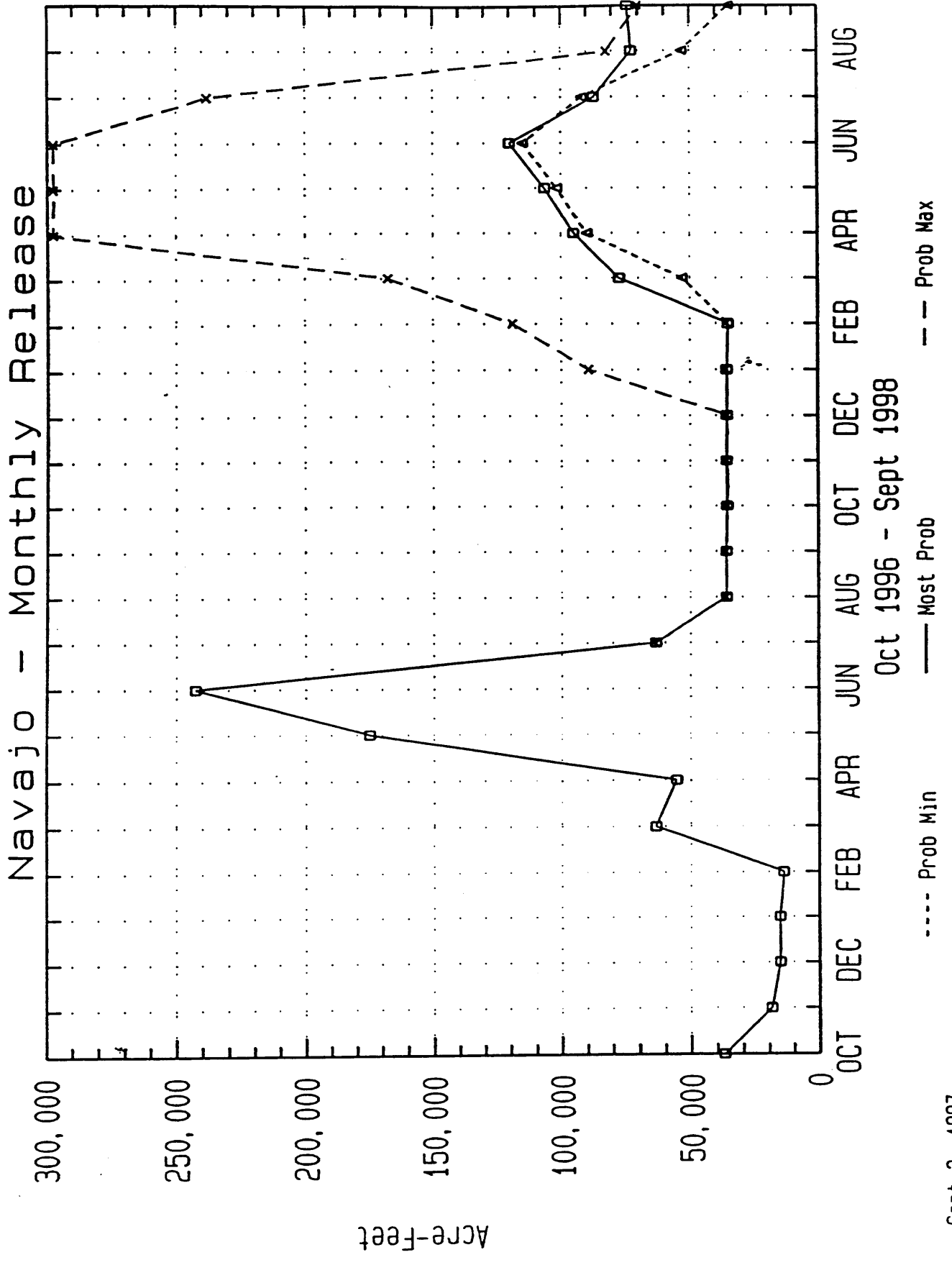


Oct 1996 - Sept 1998

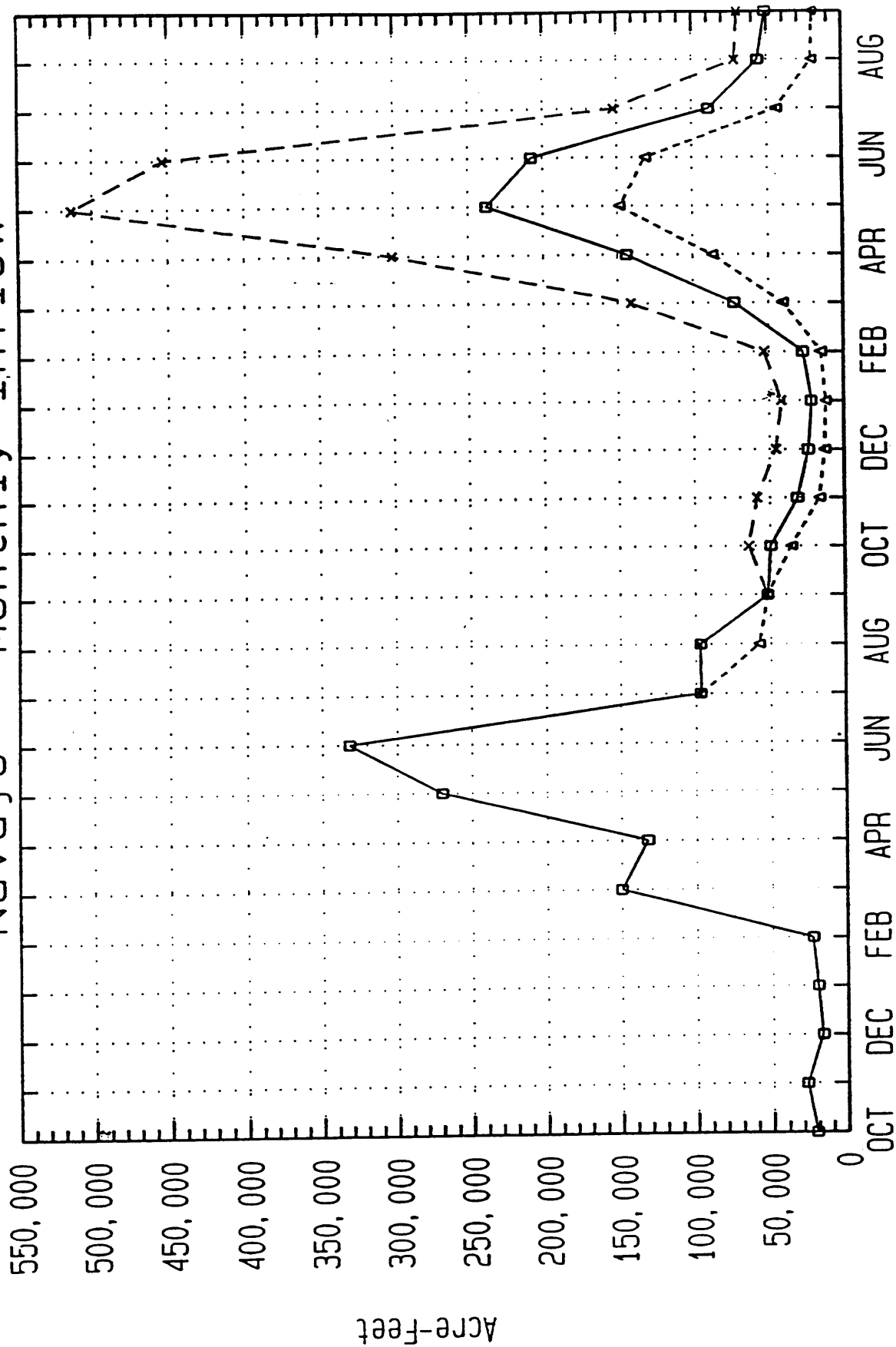
---- Prob Min ——— Most Prob - - - Prob Max







Navajo - Monthly Inflow

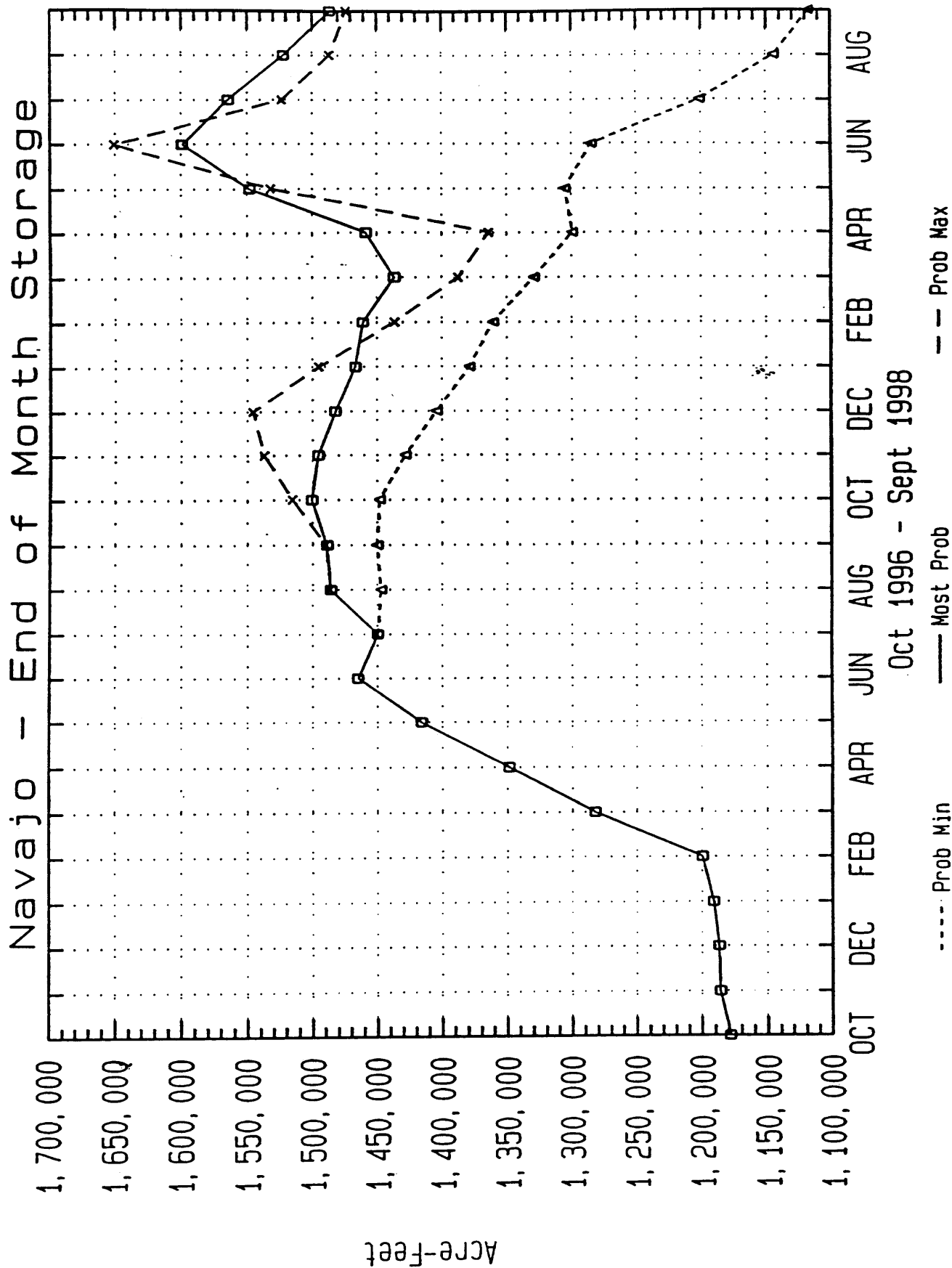


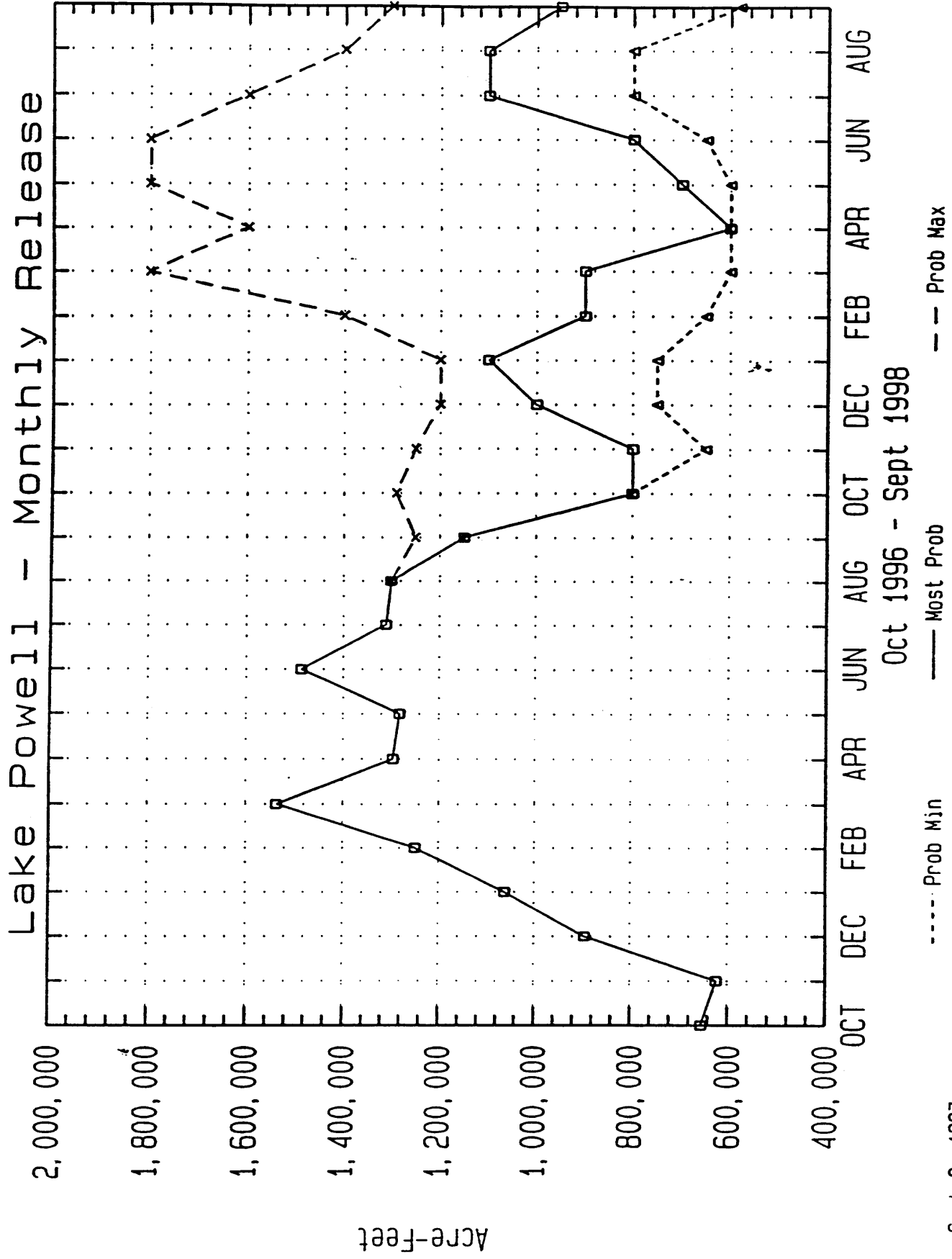
Oct 1996 - Sept 1998

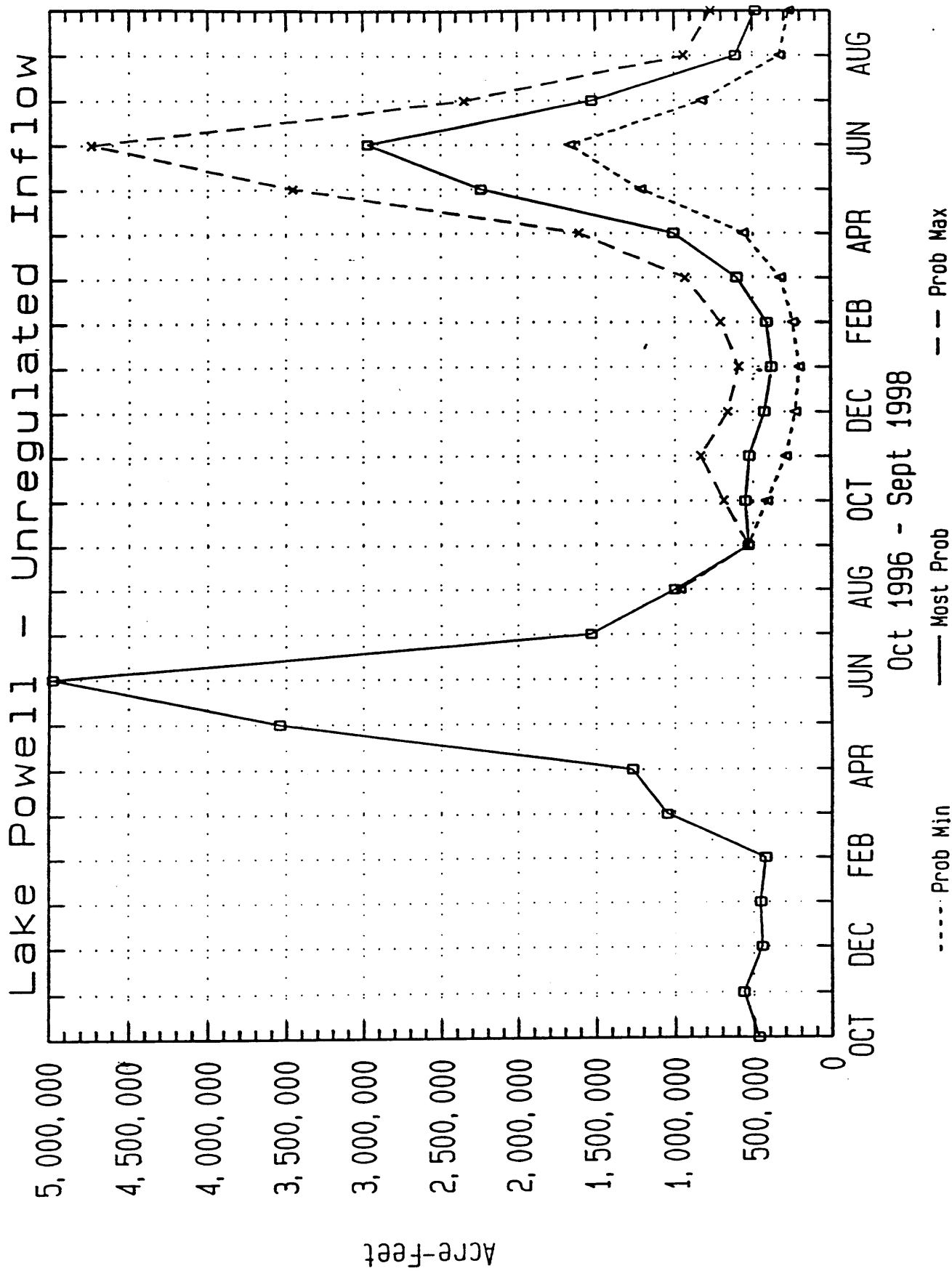
--- Prob Max

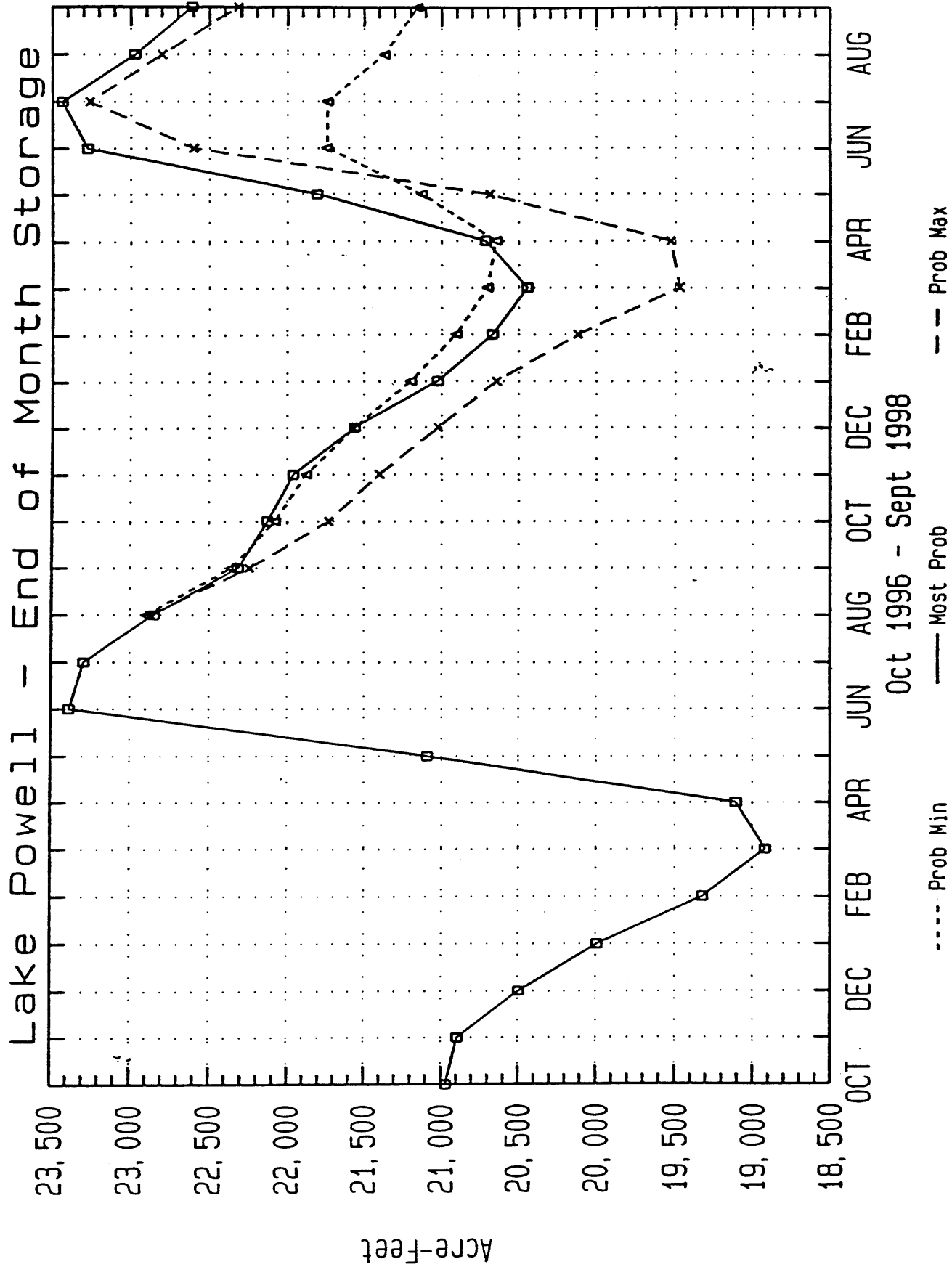
— Most Prob

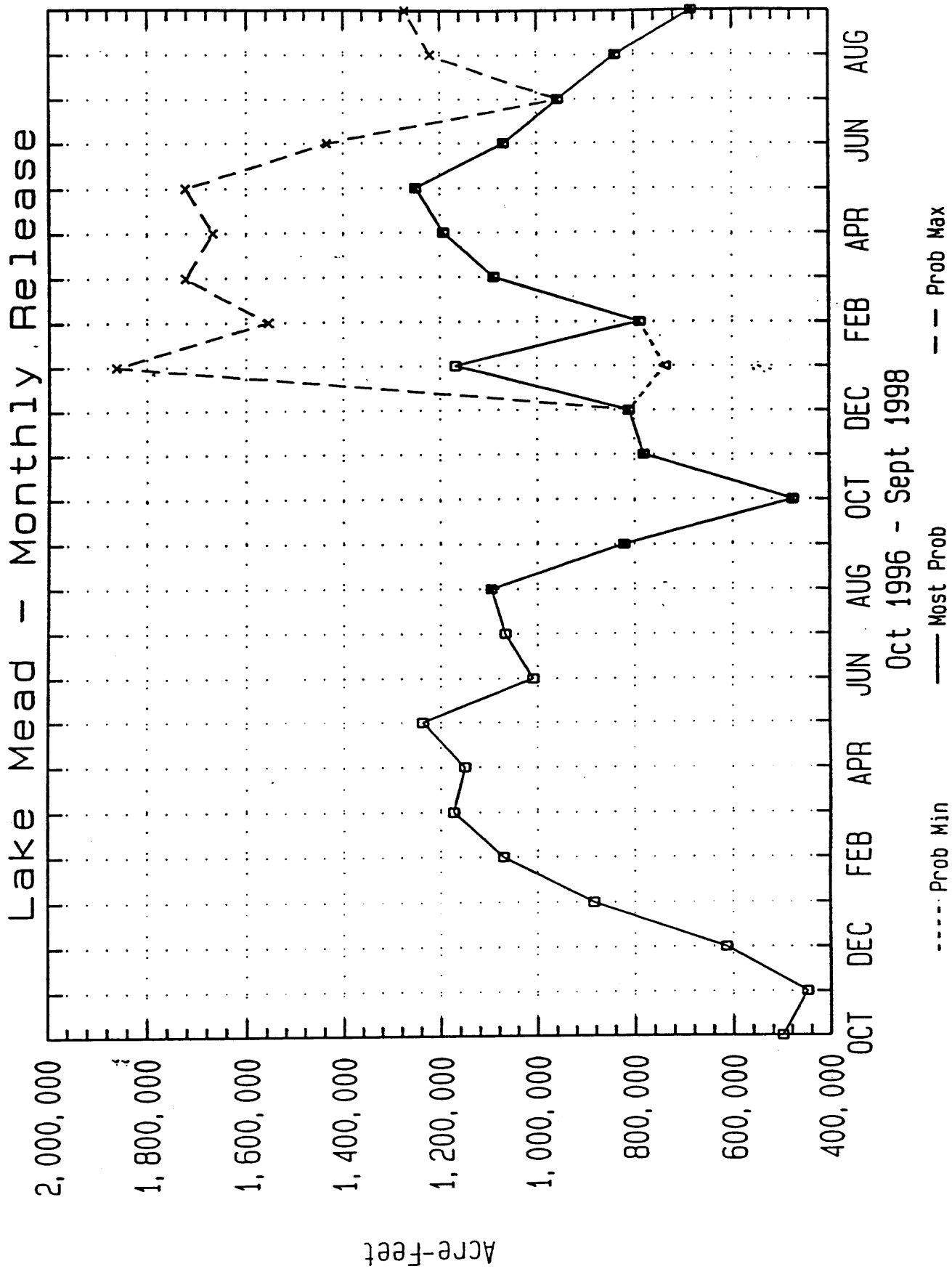
---- Prob Min



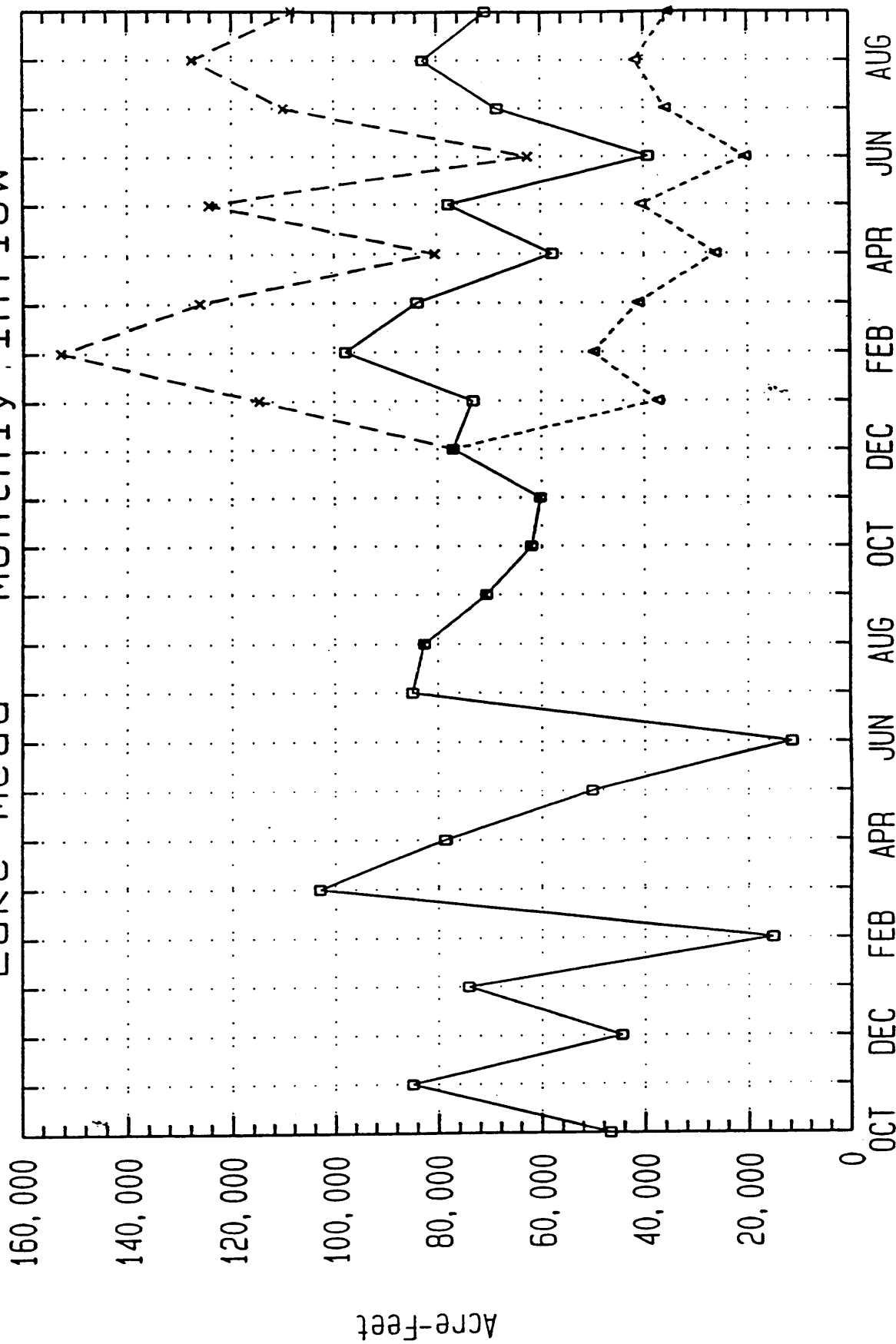








Lake Mead - Monthly Inflow



Oct 1996 - Sept 1998

--- Prob Max

— Most Prob

---- Prob Min

